

Tourism Development in Northern Circuit of Tanzania and Its Contribution in Improving Local People's Livelihood

Wilfred E. Mbowe¹, Ernest Ndunguru², & Joyce Gervas²

¹ Research Department, Bank of Tanzania, Tanzania.

² Economics Department, Bank of Tanzania-Arusha Branch, Tanzania.

Correspondence: Dr. Wilfred E. Mbowe, E-mail: wembowe@bot.go.tz, wembowe14@gmail.com.

Disclaimer: The views expressed in this article are solely those of the authors and do not necessarily represent the opinion of Bank of Tanzania or any other institution.

Received: December 31, 2020

Accepted: July 15, 2021

Available online: July 29, 2021

doi:10.11114/aef.v8i4.5311

URL: <https://doi.org/10.11114/aef.v8i4.5311>

Abstract

This study evaluates tourism development in the northern tourist circuit of Tanzania, and the extent to which the tourism activities have helped individuals and communities surrounding the natural attractions to secure the necessities of live. It employs descriptive analysis, and interview approach covering selected villages around the national parks. The results show that over 11 years to 2018/19, number of visitors rose by 66.9 percent and earnings (gate fees) by 289.5 percent making the circuit the backbone of tourism in the country. Nevertheless, the industry still faces several challenges, including volatility and moderate growth of the number of visitors in most of the parks; high concentration of visitors and earnings to only three national parks; and difficulty accessibility to some parks. One third of non-resident visitors originate from only three destinations, while about 44.5 percent of leisure and holidays visitors come under package arrangement.

On the improvement of people's welfare, tourism activities have significantly contributed in improving local people's welfare as reflected by assets they have, largely obtained through tourist induced demand. Underlining the significance tourism, self-employed respondents indicated that business sales were on average TZS 259,151 between May and September (tourist season), much higher than when off-season. Also, business entities (companies/institutions) in the areas offer direct employment to local people, in which 120 employees (mostly unskilled labour) out 182 originated from the villages. With respect to social services, many local communities benefit from various social services, with the government, natural conservation authorities, and charity organizations playing a greater role in their construction. Most of the social services are easily accessible and affordable. Meanwhile, tourism activities are generally perceived to have little negative effects on culture, respect to the society, and security in the areas as alluded to by 64 percent of 218 respondents.

To develop further the tourism industry to improve its contribution to people's living, it is imperative to: Intensifying programs on promotions and campaigns to attract both resident and non-resident visitors to less visited parks including encouraging the establishment of African style small-scaled lodges and international-standard tourist hotels where they are lacking, and ensuring taxes and park fees are competitive; Putting in place plans to ensure roads to and in national parks are accessible throughout the year to allow more visits; Enhancing the strategies for product and market diversification; Increasing programs to sensitize the local people on the importance of conserving tourist attractions in their areas, and the benefits associated with tourism; Scaling up training plans for the local people to improve their entrepreneur skills, and facilitate access to affordable loans; Encouraging establishment of tourist-standard restaurants, supermarkets, and cultural and art centres in the vicinity of parks; and scaling up measures to support establishment of social services in areas where the services are lacking or are located far from the people.

Keywords: Tanzania, tourism development, tourism benefits and disadvantages, tourism and livelihood, empirical analysis

1. Introduction

Some studies such as those of Durberry (2004), Dritsakis (2004), Ivanov and Webster (2007), and Kim et al. (2006)

indicate that tourism can contribute to economic growth and creation of employment for unskilled workers¹. Tourism can be an important instrument in driving inclusive socioeconomic growth due to its high contribution in exports earnings (UNWTO, 2017, p.27)². However, tourism may be environmentally damaging, exploitive, low paying and can cause financial leakages thus lowering its benefits to people's livelihood (Pleumarom, 2007). So, to make a sound case for importance of tourism at micro level, it is imperative to identify specific benefits to individuals and communities surrounding tourist attractions, see for example, Jamieson et al (2004); Donaldson (2007); and Kinyondo and Pelizzo (2015).

The current study seeks to investigate how tourism activities in the northern tourist circuit of Tanzania³ have contributed in improving local people's livelihood⁴. Specifically, the study evaluates tourism development in the northern circuit, and the extent to which the tourism activities have helped individuals and communities surrounding the tourist attractions to secure the necessities of live. The investigation has relevance in that; at macro level, tourism industry in Tanzania has witnessed considerable development as reflected by increase in the number of visitors in tourist attractions (at national level) by 68.5 percent to 1,867,664 in 2018/19 from 1,108,459 visitors in 2008/06. The sector also employs half a million people, and contributes about 4.2 percent and 28.7 percent of GDP and foreign exchange earnings, respectively (Bank of Tanzania [BoT], 2018). In addition, the Government of Tanzania has resolved to build an inclusive economic growth, including poverty alleviation through encouraging the development of sustainable and quality tourism (United Republic of Tanzania [URT], 1999). The Tanzania Tourism Master Plan (URT, 2002) underscores that development of the tourism sector should among other things: "... obtain sustainable benefits for the people of Tanzania by generating additional economic activity from available resources".

After the introduction, section 2 summarizes views from other studies largely focusing on advantages and disadvantages of tourism, as well as its role in improving people's welfare. This is followed by a review of policy and strategic interventions in the tourism industry at national level, and the research approach in sections 3 and 4, respectively. Discussion of study findings are in section 5, while section 6 concludes the paper.

2. Views from Other Studies

In theoretical context, tourism is an economic activity captured in the balance of payments accounts, which is considered as provision of services to non-resident visitors in the domestic economy. As for the local or domestic tourists, tourism is accounted for within the internal trade regime and captured from the relevant sectors. Linkages of tourism development to improving people's livelihood can be gauged through: first, the opportunities associated with tourist arrivals including enabling communities in the destination to sell additional goods and services to tourists. The resulting income and employment generation may help improve local people's welfare. Similar results on livelihood may be attained, if the earnings from tourism are used to support health and education services aiming at improving well-being and capabilities of the people. Second, tourism may provide opportunity to diversify local economies, particularly in poor and marginal areas, which are normally characterized by few export and diversification options. People's welfare may be improved because tourism creates new employment opportunities and income generating activities. Infrastructure and social service facilities may as well be established or improved in the rural areas using earnings from tourism thus improving the social well-being. The third channel through which tourism may affect positively the local people is by providing labour intensive and small-scale opportunities compared to other non-agricultural activities. In this respect, it employs a high proportion of vulnerable groups in the society including women.

¹ Tourism can stimulate economic growth because it requires investments, creates employment, pays salaries, and endures domestic consumption.

² In 2018, international tourism exports (travel and passenger transport) reached USD 1.7 trillion and accounted for 29 percent of the world's services exports and 7 percent of overall exports of goods and services (UNWTO, World Tourism Barometer, 2019).

³ According to Tanzania Tourism Master Plan (URT, 2002), the Northern Tourist Circuit stretches from Lake Victoria in the west to Tanga in the east, and comprises three discrete groups of attractions. The first group is the already well-established wildlife areas of the Serengeti, Lake Manyara and Tarangire National Parks and the Ngorongoro Conservation Area (including Olduvai Gorge). This group of attractions has been the backbone of Tanzanian tourism over many years and represents the 'honey-pots' of the industry. The second and third groups are Kilimanjaro National Park and Arusha National Park; and the Usambaras Mountains, Mkomazi Game Reserve and the coastal area including Tanga, the Amboni Caves (near Tanga), Pangani and the Pemba Channel, respectively.

⁴ Livelihood is defined as "means of securing necessities of live". See, LEXICO Dictionary Powered by Oxford. <https://www.lexico.com/en/definition/livelihood>.

The potential benefits notwithstanding, tourism may negatively impact an economy. Studies such as Jamieson et al. (2004), Bolwell and Weinz (2008) underscore the negative effects to include large-scale transfer of tourism revenue out of the host country; and exclusion of local businesses, inhabitants and products. Here, tourism development could enrich local elites, international and expatriate companies and generate low paying and low status employment. In addition, poorly planned and managed tourism could destroy ecological systems, displace traditional residents, raise the cost of living for local people, and damage social and cultural traditions. In aggregate, the poor could gain few direct economic benefits from tourism while bearing many of the costs.

On empirical studies, mixed findings are evident in respect to tourism benefits to poor people. Snyman (2012) evaluated various impacts of ecotourism on employment in Botswana, Malawi and Namibia focusing on household income, social welfare impacts and the number of people indirectly affected by ecotourism employment and found that rural communities are moving towards an engagement with the market economy as a result of ecotourism operations. Monthly income from employment in ecotourism was shown to enable households to invest in assets, education and “luxury” goods, which improved financial security and social welfare in remote, rural areas. Relatedly, Mbaiwa and Stronza (2010) analysed the effects of tourism development on rural livelihoods in Botswana, employing primary and secondary data sources. Results indicate that the communities surveyed have forgone traditional livelihood activities such as hunting and gathering, livestock and crop farming to participate in tourism, while livelihoods in the surveyed villages improved through community-based natural resource management (CBNRM). Through the arrangement, basic needs such as shelter, employment and income and social services including water supply systems, transportation, scholarships and payment of funeral expenses are also provided to community members.

Donaldson (2007) indicates that the ways the tourism industry is distributed and structured affected the extent to which it reduces poverty and stimulate growth in two tourism providences of Yunnan and Guizhou in China. In Yunnan for example, while tourism contributed to the province's rapid economic growth, it did little to reducing rural poverty rates. In contrast, tourism contributed relatively little to development in Guizhou but reduced poverty; this was by encouraging the participation of poor people.

Impact of tourism leakages on the local economies is examined by Chirenje et al. (2017), using structured interviews. Results reveal that out of USD 187 that is spent by each tourist in Nyanga per day, the locals only get USD 24 which is 12.83 percent and the rest goes to the service providers which are not local people, largely a result of limited linkages of ecotourism with the other livelihood options, and low local community participation in ecotourism activities. Andrew and Spenceley (2017), applying a value chain analysis (VCA) approach through semi-structured questionnaires in Botswana, found that only 37 percent of the total revenue remained in the local economy in the form of local goods (production) and services (wages).

Meanwhile, Mbaiwa (2017), using both primary and secondary data, suggest that foreign-owned safari companies and investors dominate Botswana's tourism industry, leading to the repatriation of tourism revenue, domination of management positions by expatriates and low salaries for citizen workers. Tourism also fails to significantly contribute to rural development in Botswana due to its weak linkages with the domestic economy. The study suggests that promoting more inclusive and beneficial policies and strategies would allow tourism to become more sustainable, making a significant contribution to local development. Due to foreign ownership dominance, tourism also left the local communities in poverty in Okavango, Botswana (Mbaiwa, 2003). In contrast, local ownership of tourism establishments seems to have reduced poverty in Mexico (Foucat, 2002); in Kenya (Ogutu, 2002); in Uganda (Sandbrook, 2010); and Indonesia (Walpole & Goodwin, 2000).

Empirical studies linking tourism and livelihood improvement in Tanzania are scanty; only two scholarly articles are identified. Luvanga & Shitundu (2003), using micro data, concluded that tourism has high potential for poverty alleviation. However, for that to be realized it is important to address some policy concerns including promoting tourism related activities; encouraging diversification of investment portfolios; instituting training programs that ultimately provide chance for the locals to be employed in high cadres with high pay; and putting in place measures and policies that minimize cultural and environmental pollution. In contrast, Kinyondo and Pelizzo (2015) indicate further that, tourism-induced growth in Tanzania has not always been pro-poor, and generally yielded mixed impact on the levels of inequality as captured by the Gini coefficient. The main reason for that trend is the foreign ownership dominance in the industry including accommodation and tour operation. This prevents Tanzania from enjoying the full array of economic benefits of the industry.

Although the study by Luvanga and Shitundu (2003) is micro in nature, respondents were picked from only five villages across the country, with only two villages covered in the northern tourist circuit. Similarly, the relatively recent study by Kinyondo and Pelizzo (2015) limited analysis at macroeconomic level. The current study differs from the earlier studies as it derives policy conclusions basing on an in-depth analysis basing on more recent primary information from the northern circuit, the more developed tourist destination in the country. Together with that, evaluation of tourism

development in the circuit is traced with a view to unearthing the drivers and challenges.

3. Tanzania's Policy and Strategic Interventions in Tourism Industry

Government policy and strategic interventions are evident, largely targeting at furthering expansion of tourism activities in the country. The policy aspects comprise putting in place, and reviewing of tourism policies consistent with the political, economic and social dynamics in the country. In 1991, the first National Tanzania Tourism Policy was adopted which provided objectives and strategies necessary to ensure sustainable tourism development in the country. The policy was reviewed in 1999 to cope with the need to build a private sector led economy. Some of the constraints addressed are: underdevelopment of cultural resources to attract tourists, poor coordination in land management for tourism development, lack of enough awareness by local communities of importance of tourism, minimal involvement of local communities in decision making and sharing of tourism proceeds and resources, poor institutional coordination, and inadequacy of infrastructure. The ultimate objective has been to promote growth of the economy and livelihood of the people in which the private sector plays a major role in the industry's development, while the government plays a catalytic role of improving the infrastructure and creating a conducive environment for investment.

In order to achieve the objectives of the policy, specific strategies were also developed and implemented in specific and key areas including product development and marketing, eco-tourism, cultural tourism, international and regional cooperation, land for tourism, infrastructure development, employment and human resource development, community participation, investment, financing, competition and legislation and institution participation. The Integrated Tourism Master Plan (2002) focused on developing an integrated tourism product that is capable of attracting a low volume, high yield segment of the international tourism market. Through the Plan, greater awareness has been made on Tanzania's tourism attractions; tourism products have constantly been expanded including quality improvement; and capital investment inflows.

Meanwhile, the Government is developing new brand for 'destination Tanzania' under the National Branding Committee established in December 2017. Measures in this direction will enable the tourism industry to endure competition for tourists globally (see, Tanzania's 2017 International Visitors' Exit Survey Report). In collaboration with Swiss State Secretariat for Economic Affairs, the Government has also embarked on a project to improve livelihood of the people. Through this, linkages between horticultural producers and processors and the hotel industry have been improved, and has also enhanced broader tourism sector market access. In order to provide good environment for tourism business operators, the government has reviewed the regulations for fees and charges downward, and established tourism colleges to increase the number of qualified personnel (op. cit.).

4. Study Approach

In providing answers to study objectives both descriptive analysis and interview approach are employed. Tourism development is measured through number of visitors and revenue (earnings) mainly by using secondary data. The analysis on the development of tourism also looked at purposes of visits of the tourists, age and travel arrangement. This is due to the fact that most of tourists who come to visit friends and relatives normally spend less than holiday visitors since they stay home. Further, visitors who are 65 years old and above (senior citizen) are very few but they have high expenditures. On the travel arrangement, most of the package tour payments are made before tourists arrive in Tanzania so that fewer earnings may result leading to less benefit to the country and the population living in areas surrounding tourist attractions.

As for the role of tourism to help local people and community to secure the necessities of live, we make use of primary data collected through a structured questionnaire. In aiding the analysis, we follow Jamieson et al. (2004) approach which views tourism to be pro-poor if it provides: economic gain through the creation of full or part-time employment or development of small and medium enterprises (SME) opportunities through sales to tourism businesses or to tourists, as well as other livelihood benefits such as access to potable water and roads. Improvement in roads and potable water bring benefits to ordinary producers through improved access to markets, and health of the local people. Other avenues include development of collective benefits where a community gains from concession or lease agreements with formal sector enterprises or from user fees for passing through a village or visiting a community forest, as well as charitable donations from tourism businesses or from tourists.

When assessing the positive impacts of tourism initiatives on the livelihoods of local people, the analysis also reports on negative bearings resulting from initiatives including via loss of access to grazing or water, increased cost of living for local people, adaption of foreign culture, insecurity, loss of respect and degradation of environment due to congestion of people. The aim is to gauge the net benefits of tourism activities in the areas⁵.

⁵ Note that discussion of COVID-19 effects on tourism and people's welfare in northern circuit is beyond the scope of this study.

4.1 Conceptual Framework

The study follows the conceptual framework captured in Diagram 1. In this, tourism activities in the studied areas are perceived to have both advantages and disadvantages. The net effect of this is perceived to improve or deteriorate local people's livelihood.

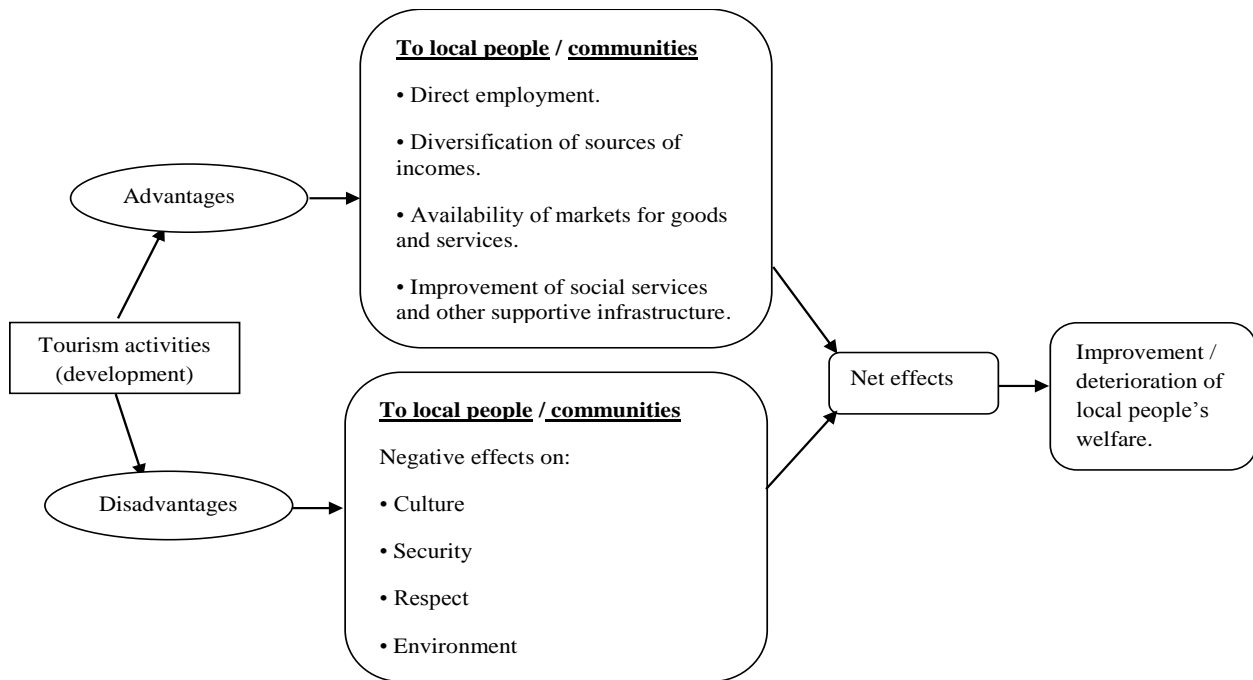


Diagram 1. Conceptual framework (Authors' construction)

4.2 Study Area, Sampling and Data Collection Instruments

The study mainly concentrates in the northern tourist circuit largely because it is the country's dominant tourist destination. Two villages were selected each around Ngorongoro Conservation Area (Arusha region), Mount Kilimanjaro and Mkomazi national parks (Kilimanjaro region), Tarangire national park (Manyara region). 22 to 40 informants were picked randomly from the villages, while balancing for gender and age, as well as proximity to the parks. Close proximity to tourist attractions means local communities residing in these villages are more likely to experience direct impact of tourism activities thereby making these villages ideal for this study.

Interviews were carried out in February 2020 using a structured questionnaire administered on homogenous informants randomly selected from each village. Checklist questions were also run on non-homogenous groups (purposive sampling) including village/group leaders, NGOs, private companies and government institutions in the villages surrounding the tourist attractions. Interview instruments were administered on the spot to allow for follow-up questions and/or clarifications where questions were not well understood by informants.

5. Study Findings and Discussions

5.1 Tourism Development in Northern Circuit

5.1.1 Performance and Challenges

As indicated earlier, in evaluating tourism development in the northern circuit and the relative importance, two indicators are used: number of visitors and revenue generation (mainly gate fees). Viewed over 11 years ago, number of visitors to the circuit rose by 66.9 percent to 1,734,397 in 2018/19 from 1,039,221 in 2008/9, while revenue (mainly fees) increased by 289.5 percent to TZS 381.5 billion from TZS 98.0 billion. As portrayed in Figure 1, the northern circuit is the country's mainstay of tourism, contributing on average over 90 percent of the total number of visitors to natural attractions and earnings in the country. Worth noting, the share of revenue has depicted an upward trend particularly from 2011/12, largely contributed by increase in non-resident visitors, who on average improved by 6.45 percent in the last ten years to 2018/19 compared to 4.76 percent for resident visitors (Figure 2). The reasons for the northern circuit's dominance in number of visitors relative to other tourist circuits (Southern and Western circuits) are taken up later.

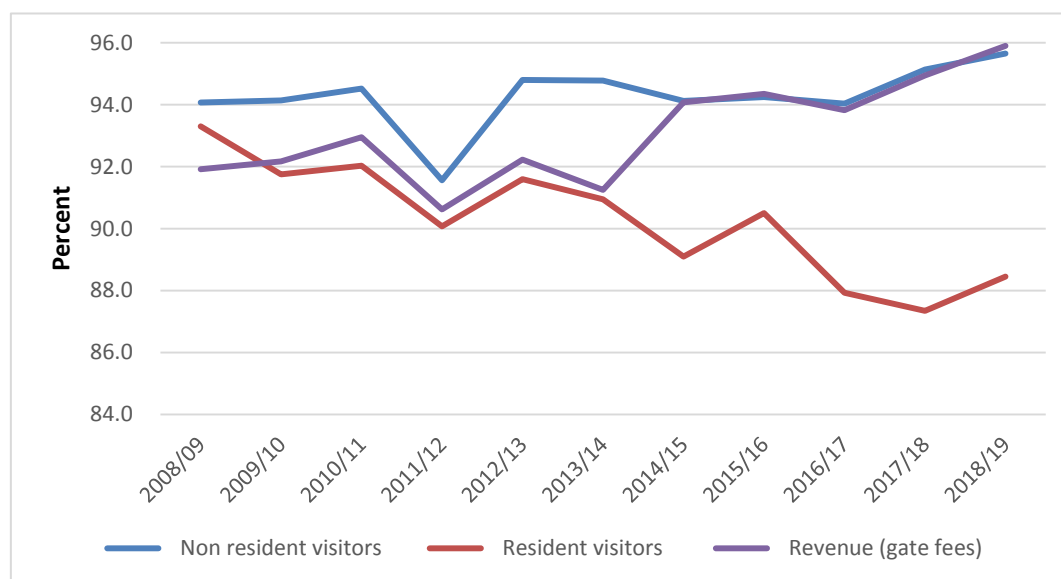


Figure 1. Northern circuit's shares of visitors and revenue

Source: Tanzania National Parks and Ngorongoro⁶, Conservation Area Authority and authors' computation

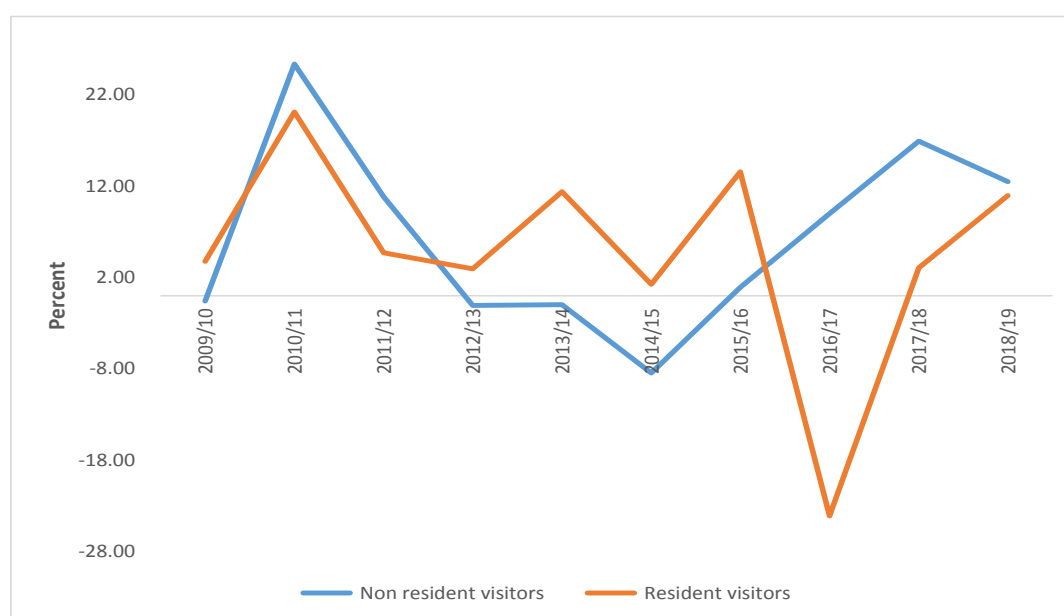


Figure 2. Growth in number of visitors to Northern circuit by origin

Source: TANAPA and Ngorongoro Conservation Area Authority and authors' computation

The volatility and moderate growth of the number of visitors depicted in Figure 2 suggest potentials for expansion of tourism activities, partly benefiting from untapped natural attractions and the policy drive of the Government. Another possibility is increasing the number of high value visitors--reflected by expenditures per visitor--who appear to have assisted the circuit to maintain an upward trend of revenue generation in the past eleven years to 2018/19; an increase of 14.91 percent in revenue despite a moderate growth of number of visitors of 5.6 percent (Figures 3). Revenue per visitor has been improving, rising from TZS 94,257 in 2008/9 to TZS 219,953 in 2018/19 (Figure 4).

⁶ In short referred to as TANAPA.

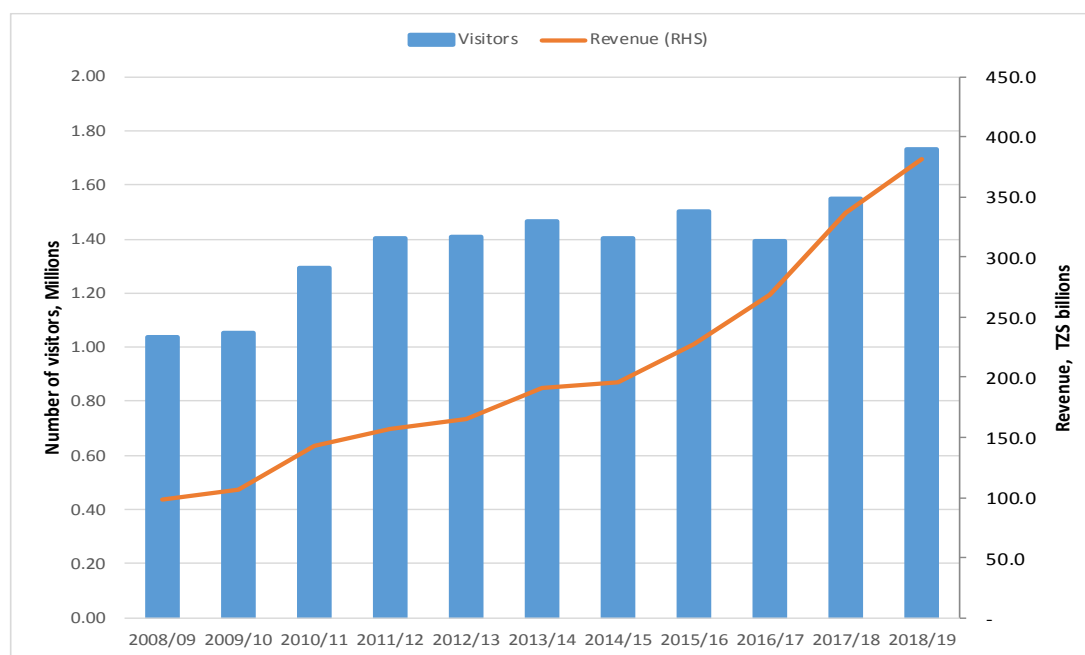


Figure 3. Number of visitors and revenue generation in Northern circuit

Source: TANAPA and Ngorongoro Conservation Area Authority and authors' computation

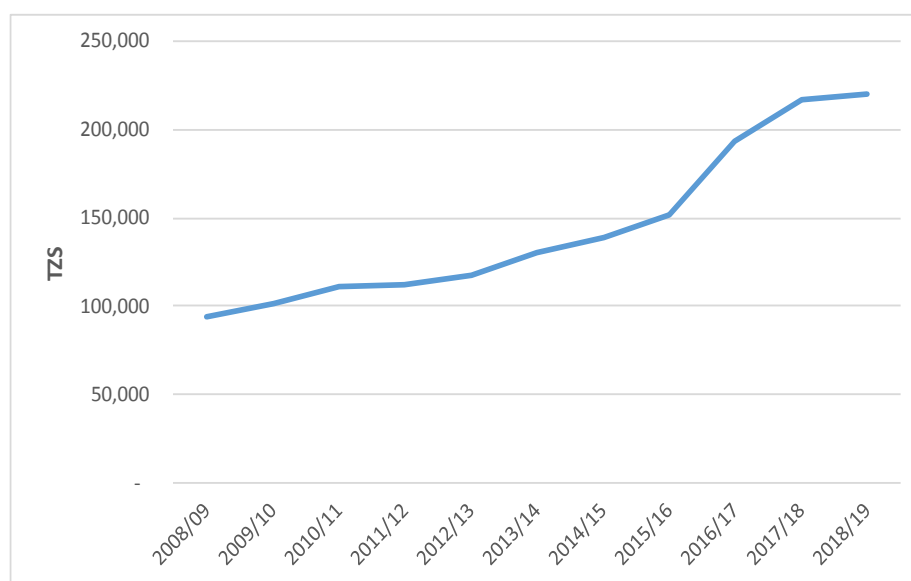


Figure 4. Revenue per person in Northern circuit

Source: TANAPA and Ngorongoro Conservation Area Authority and authors' computation

Most of the visitors and revenue are concentrated in three national parks out of the seven parks in the circuit. Ngorongoro, Serengeti and Lake Manyara altogether accounted for 79.1 percent of the circuit's number of visitors during 2008/9 to 2018/19, while Ngorongoro, Serengeti and Mount Kilimanjaro contributed 87.2 percent of the earnings (Figures 5 and 6). Also noteworthy is growth of visitors is very low for most parks pointing to remaining constraints. Growth of visitors is only evident for Ngorongoro, Serengeti and Tarangire national parks, while for Mkomasi, Kilimanjaro, and Arusha growth appears to be stagnant at relatively lower numbers; this situation also

features in earnings generation except for Serengeti, Ngorongoro and Kilimanjaro national parks (Figures 7 and 8). This finding is contrary to the Integrated Tourism Master Plan for Tanzania (2002)'s ambition to expand the Northern Wildlife Area eastwards through the Usambara Mountains, Mkomazi and north coast arc of Tanga/Pangani.

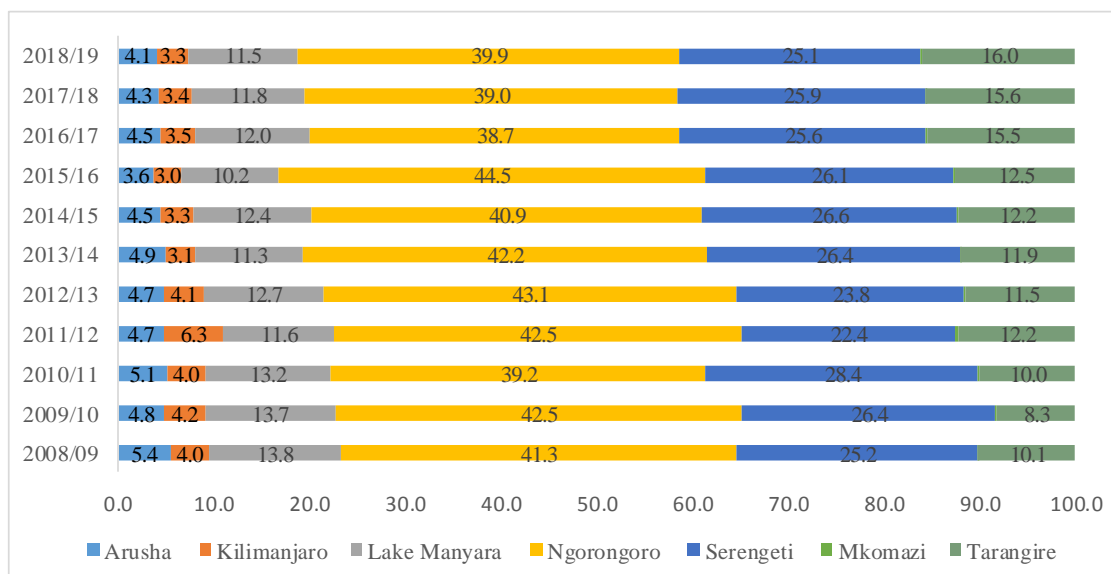


Figure 5. Share of visitors by national parks in Northern circuit

Source: TANAPA and Ngorongoro Conservation Area Authority and authors' computation

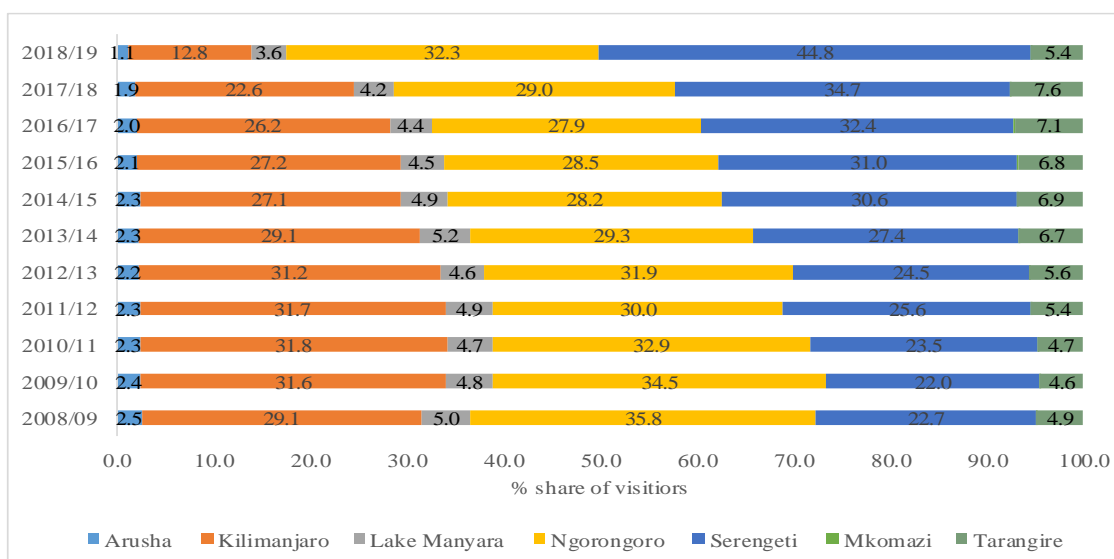


Figure 6. Share of revenue generation by national parks in Northern circuit

Source: TANAPA and Ngorongoro Conservation Area Authority and authors' computation

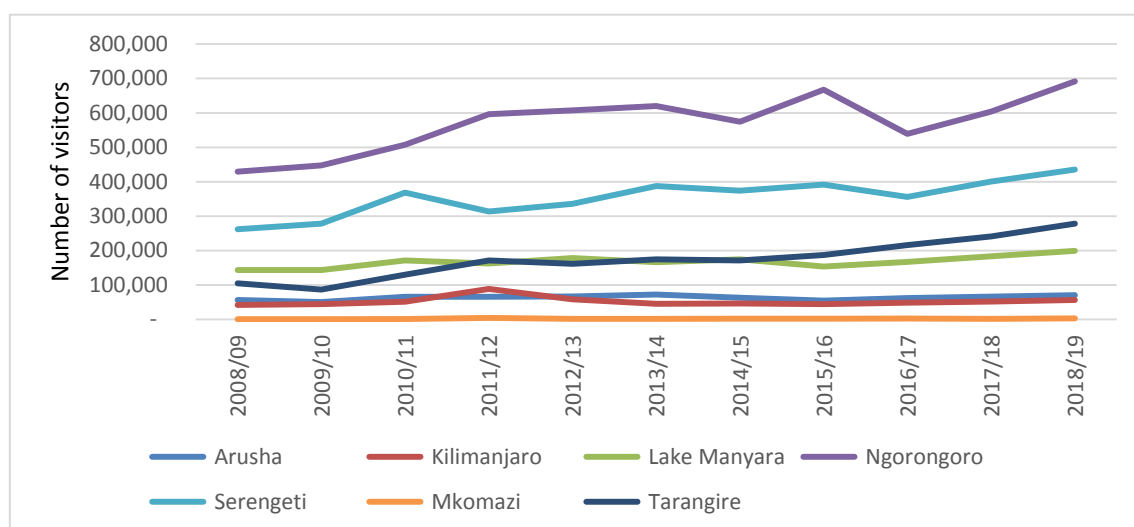


Figure 7. Trends of visitors to national parks in Northern circuit

Source: TANAPA and Ngorongoro Conservation Area Authority and authors' computation

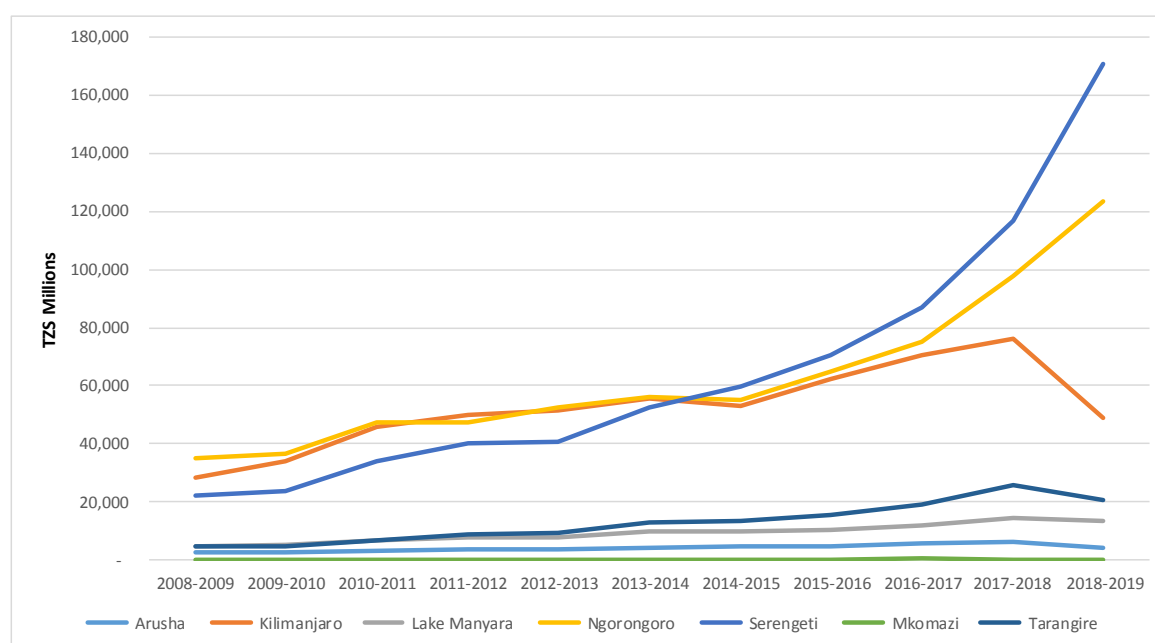


Figure 8. Trends of earnings by parks

Source: TANAPA and Ngorongoro Conservation Area Authority and authors' computation

When compared to resident visitors, non-resident visitors seem to be highly skewed to Kilimanjaro national park (with an average ratio⁷ of 19.35 for 200/09 to 2018/19) followed by far by Lake Manyara (2.12) and Tarangire (2.06), whereas Mkomazi is highly visited by resident visitors with a ratio of 0.72 trailed by Arusha park (0.95). Serengeti and Ngorongoro with the ratios of 1.15 and 1.20, respectively point to more balanced visits between residents and non-residents. Overall, this situation partly hints that opportunities exist for expanding non-resident visits to Mkomazi

⁷ Non-resident/resident visitor ratio of more than one implies non-resident visitors dominate, while resident visitors dominate when the ratio is less than one.

and Arusha parks and resident visits to Kilimanjaro, Lake Manyara and Tarangire. Figure 9 depicts the ratios of non-resident visitors to resident visitors in the past 11 years to 2018/19.

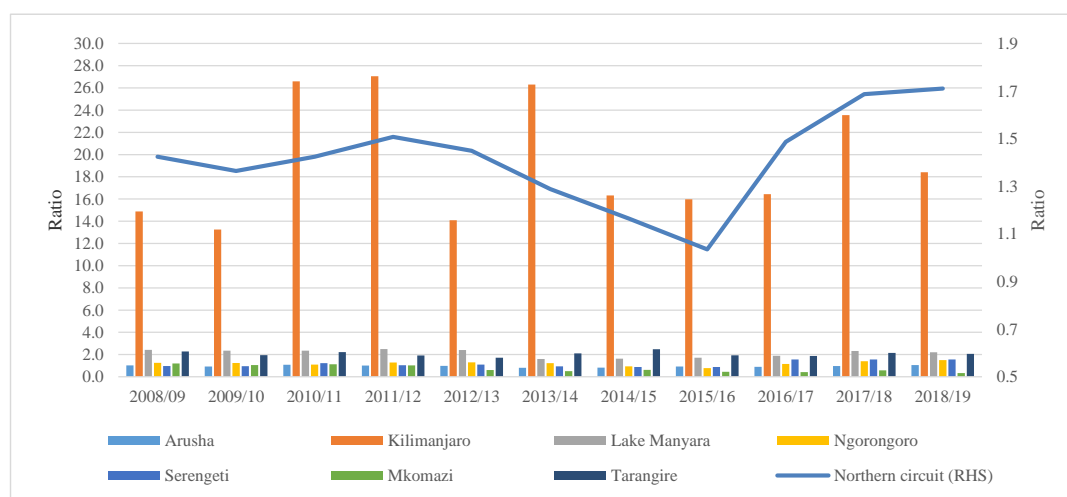


Figure 9. Ratio of non-resident to resident visitors in northern circuit parks

Source: TANAPA and Ngorongoro Conservation Area Authority and authors' computation

Note: The ratio is computed as non-resident visitors/resident visitors.

Tanzania's 2017 International Visitors' Exit Survey Report indicates that the main source markets have been diversified—including Europe, emerging and developing economies and Americas—but yet one third of the tourists still comes from only three countries (US, UK and Kenya). Meanwhile, about 85 percent of USD 2,250.3 million earned in 2017 was accrued from expenditure from visitors coming for leisure and holidays. About 44.5 percent of leisure and holidays visitors come under package arrangement, which is generally dominated by the highest spenders, i.e., visitors in mature and old age groups. Since most of package arrangements are done through overseas agents (see, Mkumbo, 2010), part of the earnings is retained in source countries thus reducing earnings to Tanzania. Thus, in order to enhance benefits from tourism to the nation, resident ownership should highly feature in tourist establishments, airline used by tourists, and tour operation and travel agency.

Stakeholders' views are that roads in some parts of the national parks are not accessible especially during rainy season. Likewise, marketing of Tanzania's tourism outside the country as a one product destination has been at the disadvantage of less known parks such as Mkomazi, Arusha and Tarangire.

Other challenges are in respect of global economic volatility with the associated decrease in people's incomes and trip cancellations. Also, high cost of compliance in terms of taxes/fees and time required to prepare documents required by different government organizations is another challenge. Investors spend more time preparing documents required by different government organizations, while the amount of money the government collects from the package is said to be relatively large leaving little for tour operators⁸.

5.1.2 Factors Contributing to Tourism Development in Northern Circuit

A number of factors explain the dominance of the northern tourist circuit relative to other national parks of Southern and Western parts of Tanzania. These include:

First, the circuit is home of wide attractions ranging from wildlife diversity, mountain climbing, and cultural and historic sites. The world-famous Big Five i.e., the lion, leopard, rhinoceros, elephant, and buffalo, is also a common sighting all year-round, while adventurous travelers who aim to take their once-in-a-lifetime trip to greater heights can easily trek the world-famous Mount Kilimanjaro or the crater of Mount Meru⁹.

Second, parks are accessible by roads and so it is easy to drive from one park to another. Since visitors usually spend a

⁸ For example, according to Tanzania Association of Tour Operators, one package of USD 5,000, the government collects USD 3,000, and the remaining amount will include transport, hotel and other cost of living, hence tour operators remain with an average of USD 300 per package.

⁹ While in Africa. <https://whileinafrica.com/tanzania-safari-circuits-explained/>

lot of time on the road during their game drives and some roads can be dusty or muddy, closed vehicles with pop-up roofs are usually used. The pop-up roofs and large windows allow excellent game viewing, at the same time maintaining safety and comfort throughout the trip. The main gateway to this circuit is the city of Arusha, which is served by Kilimanjaro International Airport. Since not a lot of direct flights to Kilimanjaro are available, tourists coming from UK, US, Europe, Middle East, and Asia usually fly directly into Kilimanjaro International Airport from Amsterdam via KLM Royal Dutch Airlines or can connect flights via Nairobi, Addis Ababa, and Dar es Salaam. Internally, there is the Arusha airport.

Third, diversification of source markets to include residents and non-residents most of whom visit the circuit due to the diversity of tourist attractions. For non-residents, diversification has moved from the traditional market in Europe to include America, emerging and developing economies.

Fourth, a lot of accommodation options are widely offered. These range from budget camps to luxury lodges and exclusive tented camps.

Fifth, product diversification and quality services including developing of new tourism products like paragliding on Mount Kilimanjaro, canopy walk in lake Manyara, mountain cycling on Mount Kilimanjaro and Mawenzi, technical climbing on Mount Kilimanjaro, night game drive and crater camping. The introduction of these new products resulted into improvement in revenue collection through increased duration of stay, repeat visitors, and product fees. Product like balloons which was only practiced in Serengeti now is also available in Tarangire. The products, which according to Mkumbo (2010), attract tourists most, are mountain climbing adventures, photographic and hunting safaris. The Exit Survey, 2017 points to wildlife accounting for 39.2 percent of tourism activities, while cultural tourism and mountain climbing contributed 7.2 percent 4.9 percent, respectively.

A study by Okello and Yerian (2009), which assessed tourist satisfaction and its links with tourist attractions and infrastructure at the national parks of Tarangire, Lake Manyara, Ngorongoro, Serengeti, Arusha, and Mount Kilimanjaro, indicate that satisfaction ratings for the Northern circuit are high, with 86 percent of tourists willing to be repeat visitors, largely attracted by wildlife viewing. About 81 percent of tourists noted that non-wildlife attractions enhanced their tourist experience. According to the Exit Survey, 2017, visitors are mostly impressed by among others good hospitality towards visitors in most of the tourist attractions, wonderful wildlife and the scenic beauty of the country, historical sites, culture and friendly people.

Sixth, proximity of the northern circuit attractions to Kenya has also helped market the tourism products. The Kenyan tourism industry is known for having developed over a long time in terms of product diversification and quality, partly enabled by investment in requisite infrastructure and intensive international promotions and campaigns sometime targeting attractions in the northern circuit, such as Mount Kilimanjaro which is the tallest freestanding mountain in the world and the tallest mountain in Africa; as well as 'The great Serengeti wildebeest migration', to lure tourists. In addition, climate change effects, terrorism and high rate of human activities in the national parks have negatively affected Kenyan tourism in favour of the northern tourist circuit.

Seventh, the interconnection of tourism attractions in the northern circuit (most of them are close to each other starting from Tarangire, Lake Manyara, Ngorongoro and Serengeti national parks) attracts many tourists as they can visit many attractions in few days at low cost.

Eighth, Tanzania National Parks Authority (TANAPA) in collaboration with Tanzania Tourist Board (TTB) have embarked on a strategy to market national parks locally and internationally to attract more visitors who are the main sources of revenue. These measures tended to benefit the northern circuit because of its higher advancement than other tourist circuits.

Ninth, other factors which partly have contributed in expanding tourism activities in the northern circuit are increase in personal wealth and disposable income in world population; less fear associated with increased perception of safety in world travel; increased skill and ability amongst Tanzanian operators to provide great experiences; facilitation of government and non-government sectors in supporting conservation and involvement of locals in tourism activities.

5.2 Perception about Importance of Tourism in Improving Local People's Welfare

The descriptive analysis suggests that the northern tourist circuit is the 'honey spot' of the country's tourism. Whether or not the benefits at macro level are shared by the local people and communities surrounding the tourist attractions remains a research issue. In the subsequent subsections, we present stakeholders views collected through field survey on how tourism activities have helped local people and communities to improve their livelihood. The survey was conducted in February 2020.

The findings are based on 224 respondents randomly selected from two villages each surrounding the national parks of Kilimanjaro, Mkomazi, Ngorongoro and Tarangire. 132 respondents (58.9 percent) were male and female were 92 (41.1

percent). Out of the 224 respondents, 200 were self-employed and the remaining 24 were employed largely in public institutions or local/foreign private companies. Of 24 informants, seven were able to diversify their sources of incomes by engaging in both wage employment and own business. Table 1 captures the main activities of self-employed respondents, where agriculture features as the main activity in most of the villages, whereas Table 2 depicts informants along selected villages and game parks. Discussions were also made with seven private institutions in the areas, TANAPA, and Tanzania Association of Tour Operators (TATO).

Table 1. The main activities of self-employed respondents

Main Activity	Frequency	Percent
Agriculture	170	85.0
Trade	15	7.5
Masonry	5	2.5
Carpentry	3	1.5
Concrete making	2	1.0
Welding	2	1.0
Cloth stitching	1	0.5
Livestock	1	0.5
Photography	1	0.5
Total	200	100.0

Table 2. Respondents across surveyed villages and game parks

Game park	Village	Frequency	Percent
Tarangire	Kakoi	24	10.7
	Sangaiwe	40	17.9
Mkomazi	Mkonga Ijinyu	35	15.6
	Majevu	29	12.9
Mount Kilimanjaro	Foo	22	9.8
	Lyasangoro	23	10.3
Ngorongoro	Marera	25	11.2
	Ganako	26	11.6
Total		224	100.0

5.2.1 Advantages of Tourism on Local People and Communities

5.2.1.1 Ownership of Basic Assets

The starting point to know whether or not tourism activities have benefited the local people is to look at their status in terms of ownership of basic assets for live. Respondents were asked to indicate if they possess basic assets such as corrugated iron roofed house (quality shelter); bicycle, motor cycle, and car (quality means of transport); mobile phone sets and radio (quality means/source of communication/information), livestock and piece of land (capital/wealth). Also, they were directed to indicate the source of funds used to acquire such assets. The results are summarized in Figure 10. They suggest that majority (83.5 percent) of the informants live in their own corrugated iron roofed houses, almost one third own a bicycle or a motor cycle, while majority own a mobile phone, a radio, livestock and piece of land, suggesting that the people surrounding the tourist attractions are generally well off. The sources of funds are mainly from own business (largely trade and agriculture) which accounted for 74.8 percent of the responses, while funds from employment in the tourism industry came third after family/relative source (Table 2). The implication is that tourism activities could be improving livelihood indirectly through diversification of economic activities, and creating market for products and services for the local people.

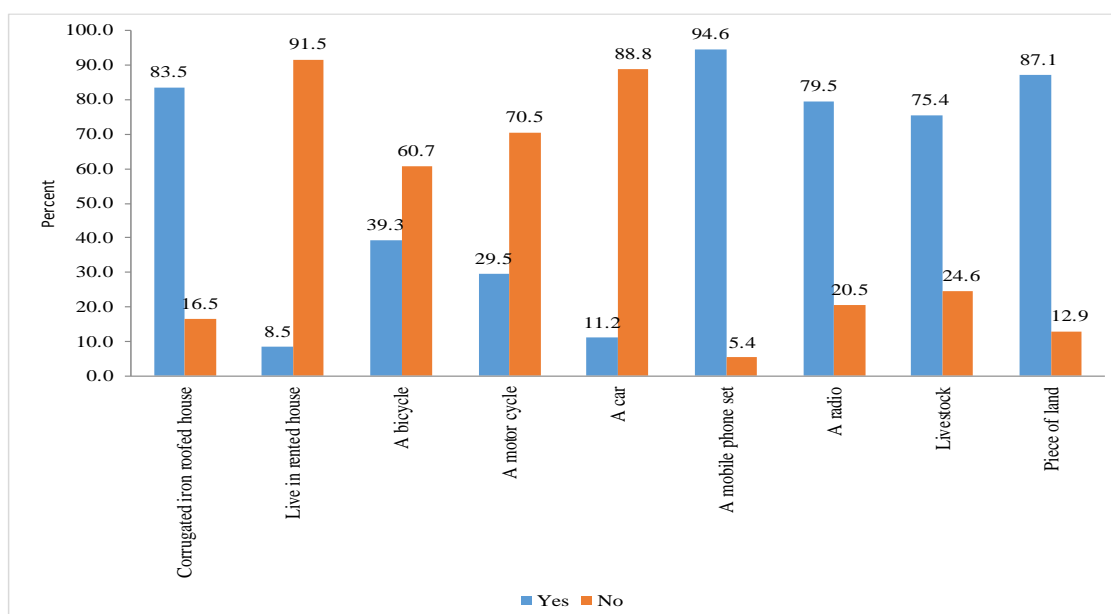


Figure 10. Basic asset ownership

Table 2. Sources of funds for acquiring basic assets (percent)

Item	Own business	Tourism employment	Private sector employment	Government employment	Financial institutions	Family/relative
Corrugated iron roofed house	83.5	5.5	1.1	1.6	2.7	5.5
Rented house	55.0	25.0	5.0	15.0	0.0	0.0
Bicycle	90.4	2.4	0.0	2.4	0.0	4.8
Motor cycle	82.6	7.2	1.4	2.9	2.9	2.9
Car	71.4	9.5	0.0	9.5	4.8	4.8
Mobile phone set	84.0	6.3	1.5	2.9	0.0	5.3
Livestock	77.0	4.3	0.6	2.5	1.9	13.7
Radio	83.5	5.9	1.8	4.1	0.0	4.7
Piece of land	45.6	2.6	0.5	2.6	1.0	47.7
Average	74.8	7.6	1.3	4.8	1.5	9.9

5.2.1.2 Availability of Markets for Goods and Services

Opportunities associated with visitor arrivals include enabling local people in the destination to sell additional goods and services. It was indicated that due to tourism activities, people are able to engage in tourism related activities like cultural tourism which includes, selling traditional and agriculture products needed by hotels and other actors.

From self-employed activities point of view, the study findings suggest that most of the local businesses depend on customers within the village (Figure 11). Response on tourist related customers is low; this is not surprising as respondents could have faced difficulties in identifying the background of their customers. Discussions with selected village leaders support the view that the tourism activities have stimulated demand for some goods and services, particularly merchandize trade, agricultural products, cultural entertainment, and craft related items. Confirming this view, self-employed respondents indicated that business sales were on average TZS 259,151 between May and September (tourist season), much higher than when off-season. Respondents were also able to improve their incomes by engaging in tourist related activity (Figure 12).

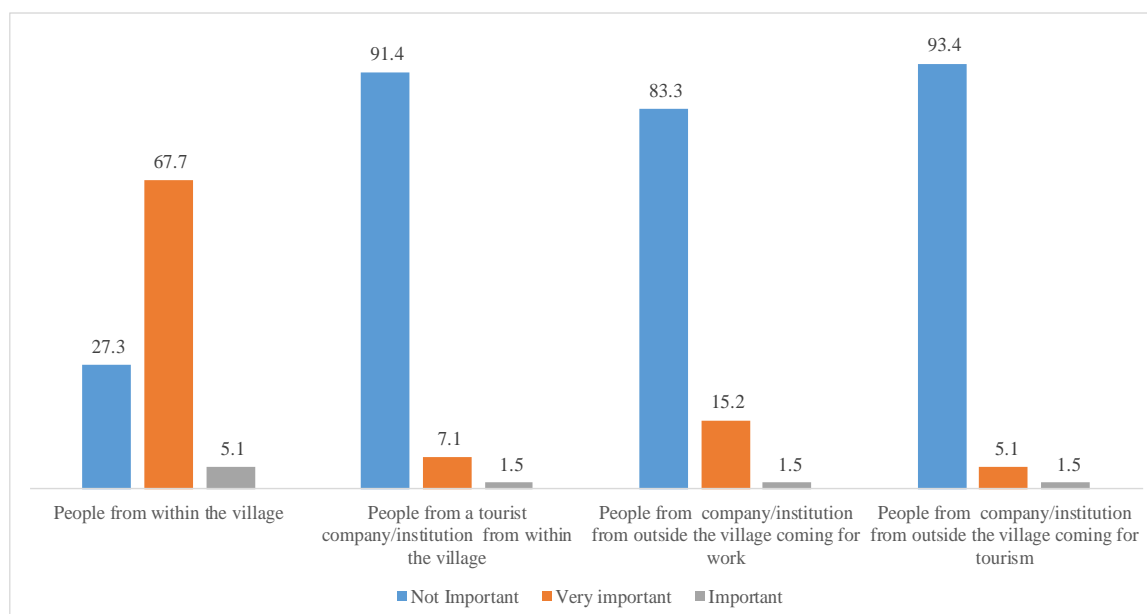


Figure 11. Main customers of self-owned businesses (in percent)

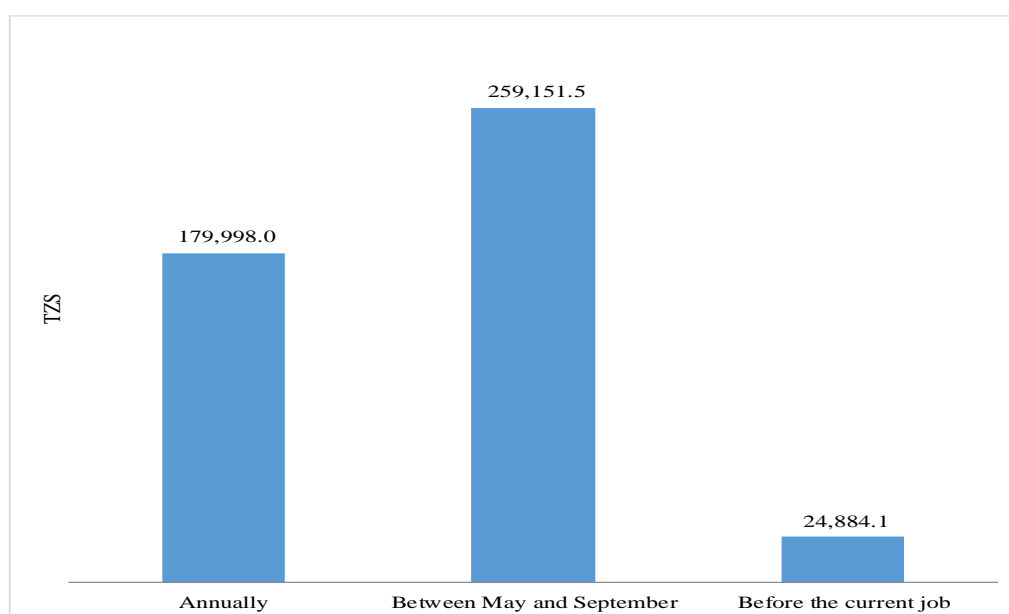


Figure 12. Income from self-owned businesses

To confirm results from self-employed people on the relevance of tourism related activities in creating markets for local people's goods and services, selected big business owners, NGOs and other institutions in the study areas were requested to indicate the main source of their basic needs such as food items, furniture and fittings, vehicle and spare parts, cultural entertainment services, security services, personnel and unskilled labour, office stationery and information communication and technology (ICT), kitchen appliances and cultural decorations. Their main source was found to be within the villages, especially for security services, food and drinks, cultural entertainment and decoration of surroundings, and unskilled labour (Table 3). In some villages, the products were sourced outside the villages attributed to constraints such as lack of restaurants, supermarkets and processing firms in the vicinity of the parks. Some respondents showed that local people fail to respond to demand for various products due to small scale operations attributed to limited financial capability for expansion and entrepreneur skills. About 85 percent of self-employed respondents specified that they depend on their own savings for business startup and operations, partly due to

difficulties in accessing loans from financial institutions accredited to high borrowing costs including lending interest rate and short repayment period.

Table 3. Institutions main source of basic needs (Frequency)

Item	Within the village	Outside the village	Outside the country
Food	3	2	1
Soft and hard drinks	4	2	1
Furniture and fittings	3	2	1
Vehicles and spareparts	2	1	1
Cultural entertainment services	4	2	1
Security services	5	1	1
Qualified personnel	2	2	1
Personal services	2	2	1
Unskilled labour	4	2	1
Office stationery	1	2	1
Office ICT	1	2	1
Kitchen appliances	3	1	1
Cultural decoration of surrounding	4	2	1

5.2.1.3 Direct Employment and Diversification of Local People's Sources of Income

In order to measure the role of tourism activities in generating jobs for local people, first, individuals were asked to indicate if they were self-employed or employed. Second, business owners, NGOs, and other institutions in the study villages were directed to indicate number of people employed by their institutions from the village(s) surrounding tourist attractions including type of job, level of education and wages. The findings confirm that tourism activities have partly helped local people to get direct decent employment.

Out of 24 individuals who were on wage employment, 13 were employed in tourism related activities, while 10 were in government (Figure 13). On average, a worker was paid TZS 497,917, threefold of TZS 150,025 earned before joining the job. For tourism related employment, seven respondents claimed to be engaged in auxiliary duties such as drivers, tour guide, chef and security guards; while five worked as lodge managers.

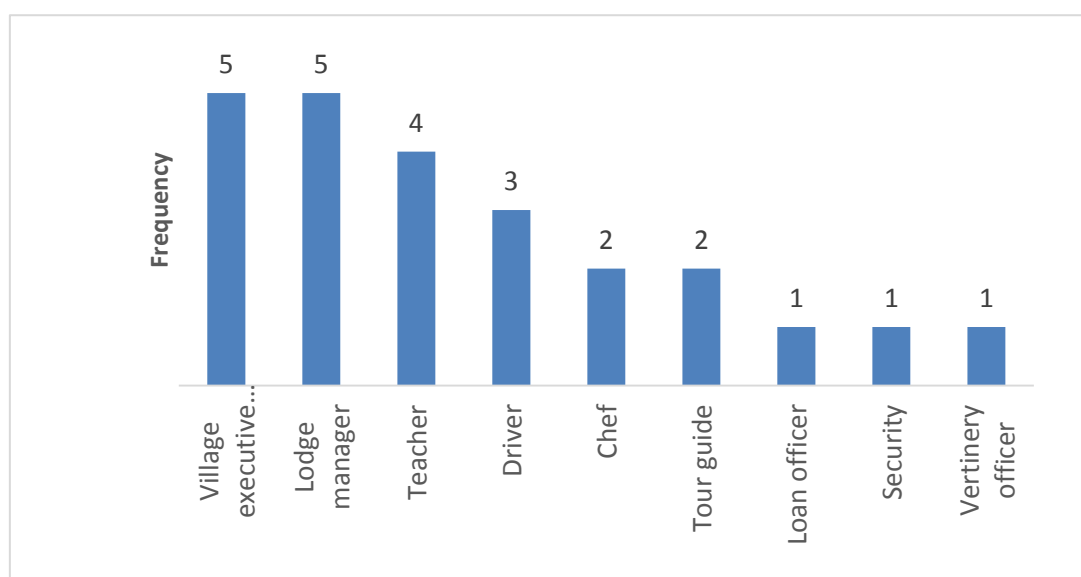


Figure 13. Direct employment to local people

Direct employment of local people is also evident for businesses, NGOs, and other institutions, particularly in cultural tourism, guest houses/lodges, and children home schools, tour, and tourist accommodation or camp sites. For the seven institutions which responded to the study questions, they indicated that out of 182 people they employed, 120 were from within the villages (mostly unskilled labour) and 62 from outside, of which permanent employees were 108 and 56, respectively (Table 4). The average incomes were TZS 766,666 for managerial post; TZS 716,667 for professionals; and TZS 400,000 for auxiliary duties. The implication of these results is that tourism can help create new job and income opportunities for local people. That is, the local economy has an opportunity to develop further new forms of income generation, which is good news especially for communities that rely only on single industry such as agriculture or livestock. However, it is worth noting that, out of 164 employees, 5 and 13 had university and college education respectively, implying majority of the other employees are less educated (Figure 14). It is not surprising therefore to note that the institutions largely employed unskilled labour from the villages.

Table 4. Employment by business owners and institutions in surveyed villages

Type	Within the village	Outside the village	Total
Permanent	108	56	164
Temporary	12	6	18
Total	120	62	182

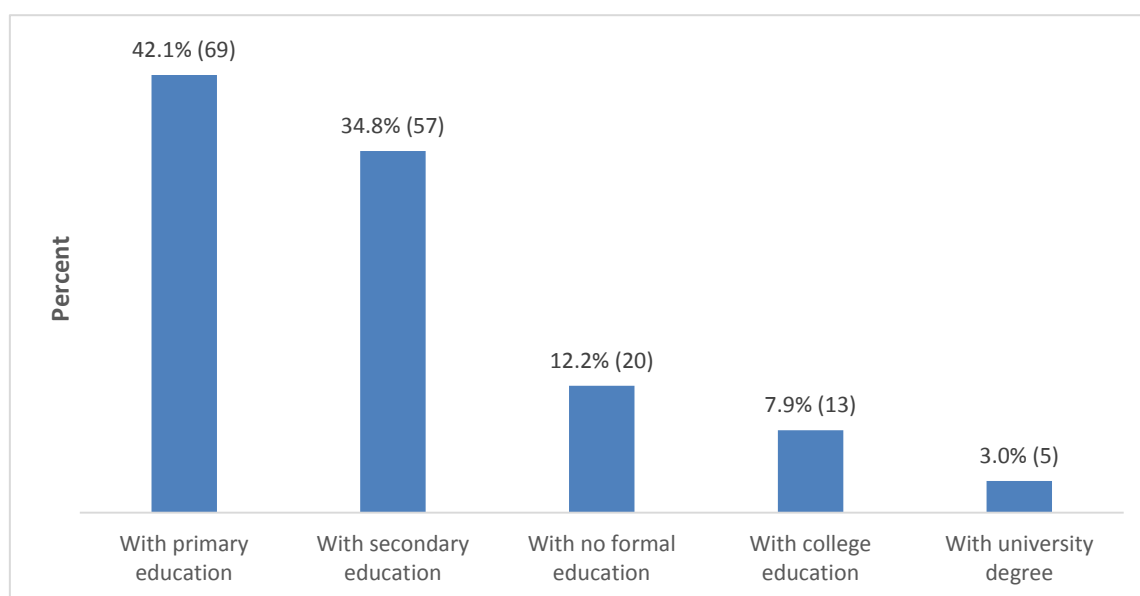


Figure 14. Level of education of employees employed by business owners and institutions

Note: In brackets are frequency.

5.2.1.4 Social Services Improvement

As for social services, responses tend to support the view that local communities have benefited from various social services available in the areas. These include schools for pupils, health facility, utility such as water and electricity, and road. Stakeholders have as well participated in environmental conservation, which is important for the sustainability of tourism activities. The findings point to government (central government and local government), natural conservation authorities, and charity organizations playing a greater role in the construction of the social amenities, supporting the view that part of earnings from tourism are returned back to the local community (Figure 15). Discussion with stakeholders suggest that, community living adjacent to a park receives support in different projects such as building

schools and construction of health care buildings depending on the community's needs, in which TANAPA contributes 70 percent and community 30 percent.

Most of the social services are said to be accessible as they are in a distance of less than one kilometer or one to 2 kilometers and, are affordable (Figure 16 and 17). It is worth pointing however that drinking water and electricity were not available in some villages as supported by 22 percent and 37 percent of respondents respectively, while about 40 percent indicated secondary school to be in a distance of more than five kilometers, requiring measures to fix the problem.

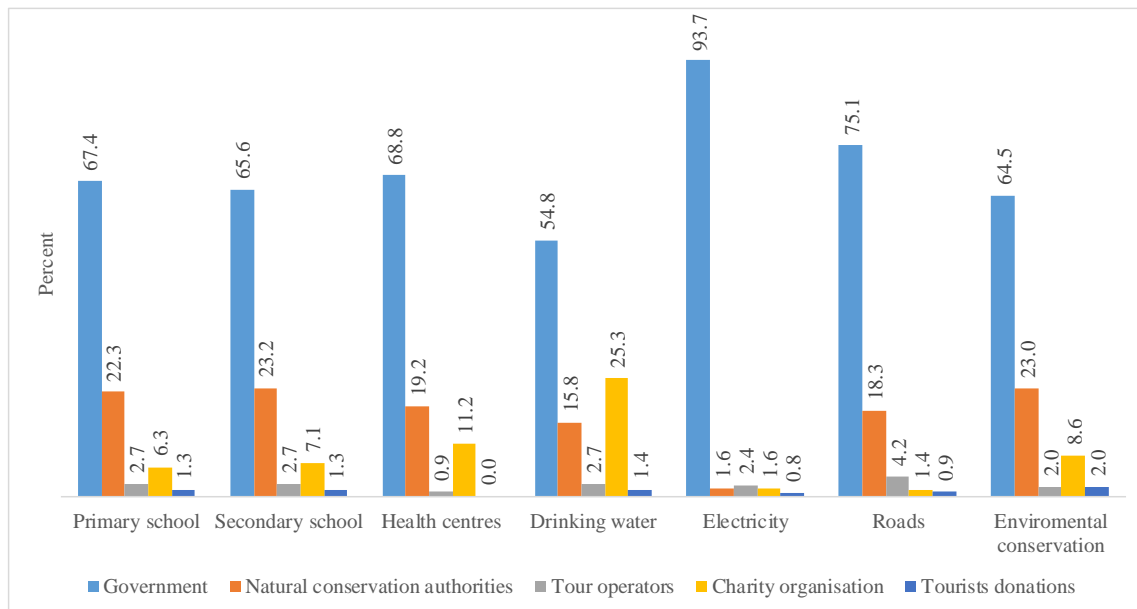


Figure 15. Relative importance of different actors in social services provision

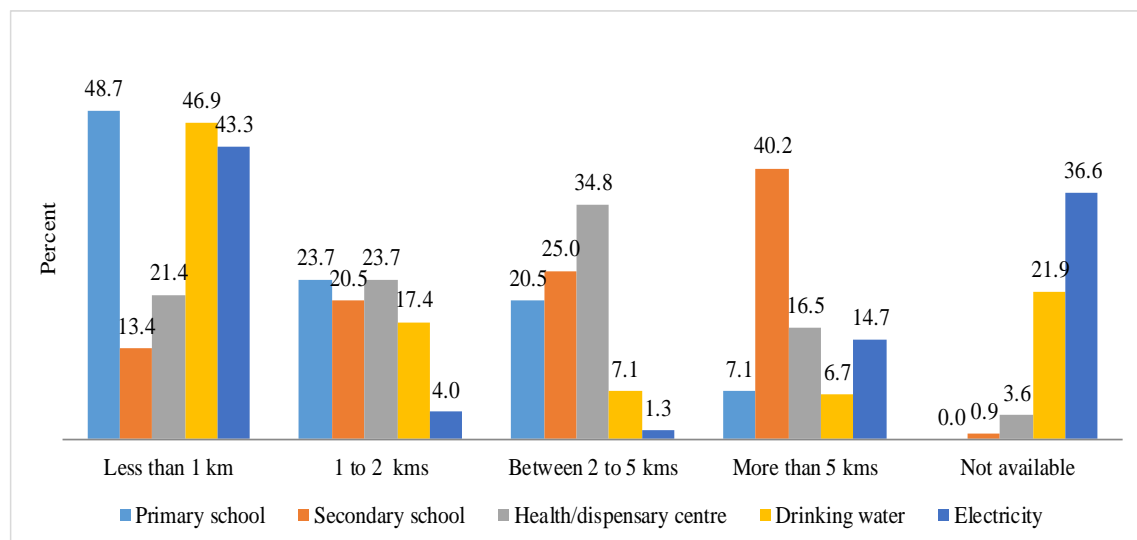


Figure 16. Accessibility of social services

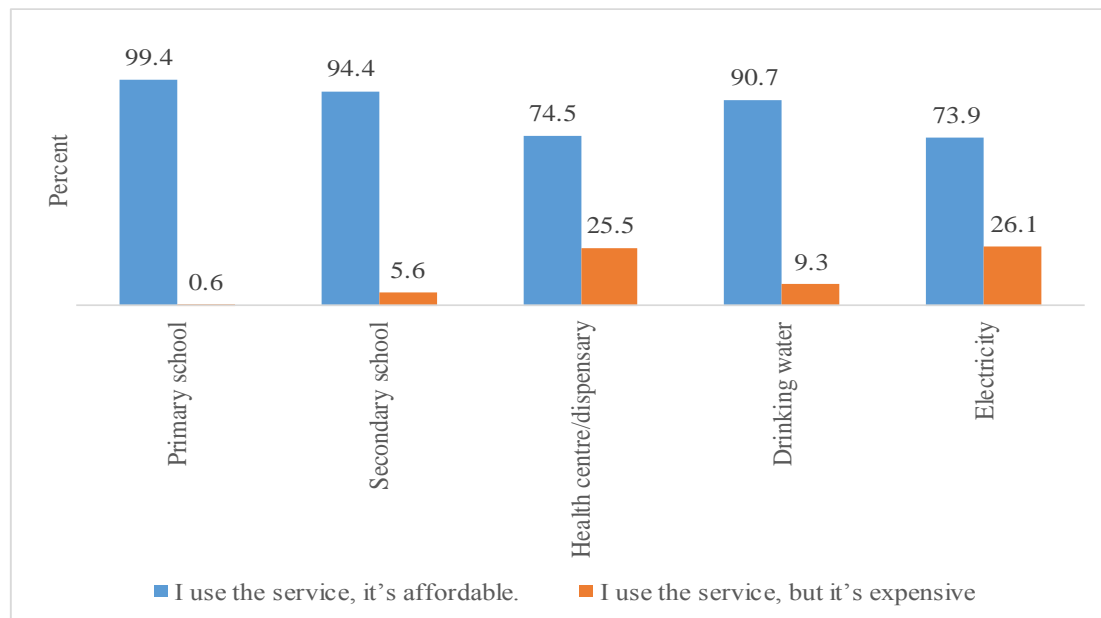


Figure 17. Affordability of social services

5.3.2 Perception on Disadvantages and Net Effects of Tourism on Local People and Communities

Tourism does not come with advantages alone; it may also impose negative effects on local people's life. Sometime negative effects could outweigh advantages. To test for this, respondents were required to specify negative effects on culture (adaption of new culture), security of the people, respect to people, and environment in their areas. Generally, informants' perception is that no big impact has been imposed on these aspects, more so for culture and respect to society. However, a noble reservation is eminent on environment due to congestion in some villages, and security as supported by 32 percent and 26 percent of respondents, respectively (Figure 18).

Conversation with selected village leaders indicated that increase in the number of people in the villages surrounding national parks has also exerted pressure on land. This has led to increase in conflicts between the local people and the authorities mandated to conserve the natural attractions, especially in balancing between land for local people's use—particularly for residence, agriculture and grazing—and conservation for tourism. With this, some people sometime engage in poaching activities or illegally encroach the parks for personal benefits.

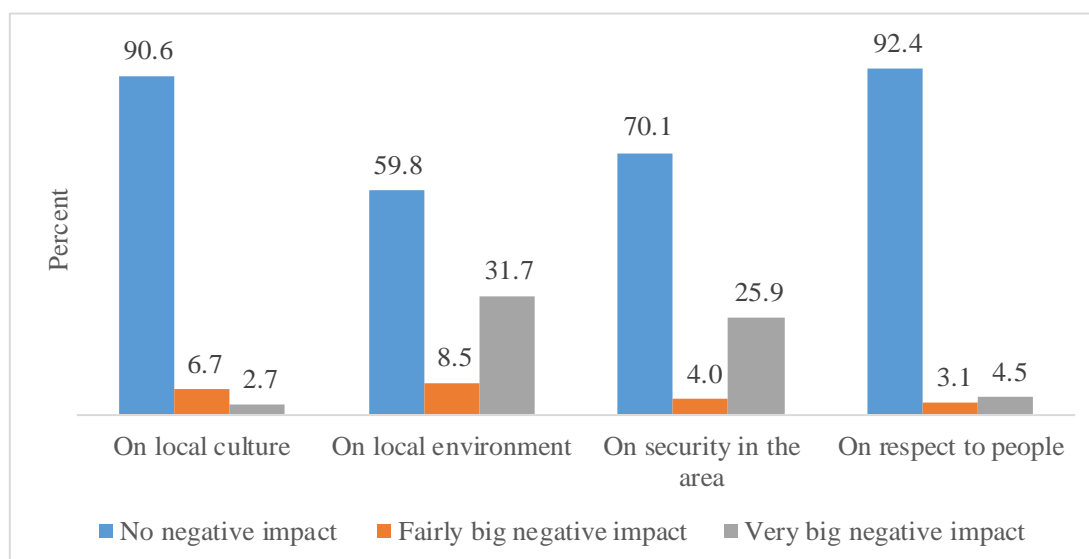


Figure 18. Impact of tourism on local community's culture, security, respect and environment

Advantages and disadvantages considered together, most of the people are of the opinion that advantages outweigh disadvantages. As depicted in Figure 19, about 64 percent of 218 respondents were of the view that advantages of tourism activities were much higher than disadvantages. Only about one quarter of the informants were in favour of higher disadvantages. These results propose that measures to develop the tourism industry are likely to improve people's welfare as well.

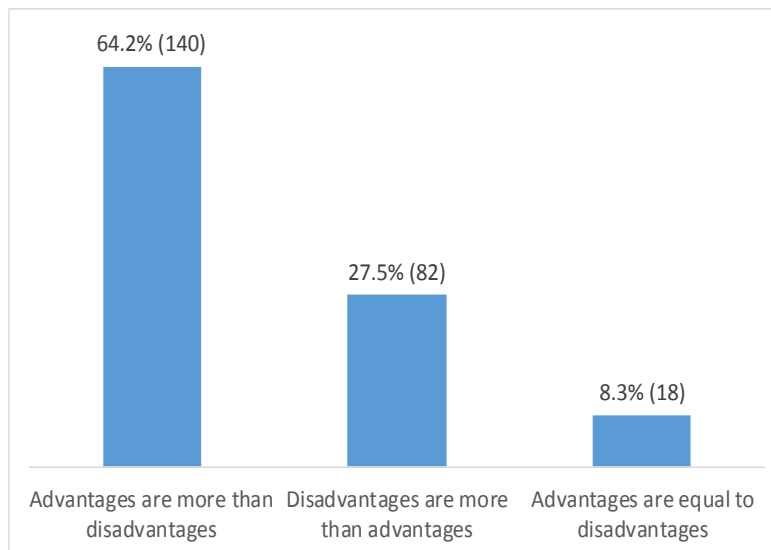


Figure 19. Respondents perception about net effect of tourism activities in their areas

6. Conclusion and Policy Recommendations

This study sought to investigate how tourism activities in northern tourist circuit have contributed in improving local people's livelihood. In particular, it assesses tourism development in the northern tourist circuit of Tanzania, and the extent to which the tourism activities have helped individuals and communities surrounding the natural attractions to secure the necessities of life. It employed both descriptive analysis and interview approach carried on selected villages around the national parks of Ngorongoro, Tarangire, Mount Kilimanjaro, and Mkomazi.

The findings indicate that tourism activities in the northern circuit have recorded considerable development. Over 11 years to 2018/19, number of visitors rose by 66.9 percent and earnings by 289.5 percent. The circuit remains the country's mainstay of tourism, contributing over 90 percent of the number of visitors to natural attractions and earnings in the country. But, the industry still faces some challenges, including volatility and moderate growth of the number of visitors in most of the parks; high concentration of visitors and revenue to only three national parks; difficulty accessibility to some parks, especially during rainy season; askew marketing of parks that has skewed visitors to few and specific parks; and high cost of compliance in terms of taxes/fees and time required to prepare documents required by different government organizations. Efforts to diversify source markets notwithstanding, one third of non-resident visitors originate from only three countries (US, UK and Kenya), while about 44.5 percent of leisure and holidays visitors come under package arrangement, normally settled through overseas agents.

It was found that tourism activities have greatly contributed in improving people's welfare. Most of the informants live in their own corrugated iron roofed houses, own a bicycle or a motor cycle, a mobile phone, a radio, livestock and piece of land; largely acquired by using income obtained from own business as indicated by 74.8 percent of the responses. Underscoring the relevance tourism, self-employed respondents indicated that business sales were on average TZS 259,151 between May and September (tourist season), much higher than when off-season.

In addition, business owners, NGOs and other institutions provide market, including security services, food and drinks, cultural entertainment and decoration of surroundings. However, some products are sourced outside the villages attributed to constraints such as lack of restaurants, supermarkets and processing firms in the vicinity of some parks due local people's failure to respond to demand for various products and services owing to small-scale operations, limited entrepreneur skills, and capital. About 85 percent of self-employed respondents specified that they depend on their own savings for business startup and operations, partly due to difficulties in accessing loans from financial institutions attached to high borrowing costs. The institutions also offer direct employment to local people, mainly in cultural tourism, guest houses/lodges, children home schools, tour, and tourist accommodation or camp sites. Out of 182 people

employed by the institutions, 120 were from within the villages (mostly unskilled labour) and 62 from outside, all with an average monthly income of TZS 627,778.

On social services, local communities have benefited from various social services, in which the government (central government and local government), natural conservation authorities, and charity organizations play a greater role in their construction. Most of the social services are accessible as they are in a distance of less than one kilometer or one to 2 kilometers and, are affordable. Nevertheless, drinking water and electricity are less accessible in some villages as supported by 22 percent and 37 percent of respondents respectively, while about 40 percent indicated secondary school to be in a distance of more than five kilometers.

Generally, most of the respondents perceive tourism activities to have little negative effects on culture, respect to the society, and security. In aggregate, 64 percent of 218 respondents perceived that tourism has more advantages than disadvantages, implying that measures to develop the tourism industry are likely to as well improve people's livelihood.

In order to develop further the tourism industry in the northern circuit to enhance its contribution to people's livelihood, it is recommended to:

- a) Strengthen promotion and campaign programs to attract both resident and non-resident visitors to less visited parks. Such efforts should work to increase non-resident visitors particularly to Mkomazi and Arusha parks and resident visitors to Kilimanjaro, Lake Manyara and Tarangire. There is need to encourage establishment of African style small-scaled lodges and international-standard tourist hotels where they are lacking, while ensuring that taxes and park fees are competitive.
- b) Put in place strategies to ensure that roads to and in national parks are accessible throughout the year to attract more visitors throughout the year.
- c) Enhance the strategies for product and market diversification aiming at cushioning the industry from whims of global economic volatility and the associated decrease in people's incomes. New products could include bike trails, cable car tourism, wild fitness parks, bungee jumps, horse ride, game drive particularly within the WMAs. Other areas are scaling up cultural, sports and zip line tourism where they are absent.
- d) Increase programs to sensitize the local people on the importance of conserving tourist attractions in their areas, while taking advantage of available opportunities including jobs, diversification of sources of incomes, and improved social services.
- e) Scale-up educational programs to sensitize local people to cooperate in producing more consumable goods needed by lodges and other actors around the natural attractions. Here, it will be important to increase training of local people to improve their entrepreneur skills, and facilitate access to affordable loans that are key for start-up and expansion of micro, small and medium activities in the areas.
- f) Encourage establishment of tourist-standard restaurants, supermarkets, and cultural and art centres around the parks with a view to meeting the demand for various products and services.
- g) Improve measures to support establishment of social services in areas where the services are lacking or are located far from the people.

Acknowledgement

We are thankful to Bank of Tanzania's Management for their financial support and by allowing us to carry out this study.

References

- Andrew Rylance & Anna Spenceley (2017). Reducing economic leakages from tourism: A value chain assessment of the tourism industry in Kasane, Botswana. *Development Southern Africa*, 34(3), 295-313. <https://doi.org/10.1080/0376835X.2017.1308855>
- Bank of Tanzania. (BoT, 2018). *Annual Economic Report for the Year 2017/18*. Dar es Salaam.
- Bolwell, D., & Wolfgang, W. (2008). Reducing poverty through tourism. *Working Paper WP.266*. International Labour Office Geneva, October.
- Chirenje, L. I., Joseline, C., Simbarashe, G., Bernard, C., & Leonard, C. (2017). The Impact of tourism leakages on local economies: A case study of Nyanga District, Zimbabwe. *Journal of Human Ecology*, 42(1). <https://doi.org/10.1080/09709274.2013.11906576>
- Donaldson, J. A. (2007). Tourism, development and poverty reduction in Guizhou and Yunnan. *The China Quarterly*, No. 190 (June), pp. 333-351. Cambridge University Press. <https://doi.org/10.1017/S0305741007001221>
- Dritsakis, N.(2004). Tourism as a long-run economic growth factor: an empirical investigation for Greece using

- causality analysis. *Tourism Economics*, 10(n. 3), n-316. <https://doi.org/10.5367/0000000041895094>
- Durbarray, R. (2004). Tourism and economic growth: the case of Mauritius. *Tourism Economics*, 10(4), 389-401. <https://doi.org/10.5367/0000000042430962>
- Foucat, V. S. A. (2002). Community-based ecotourism management moving towards sustainability in Ventanilla, Oaxaca, Mexico. *Ocean and Coastal Management*, 45, 511-529. [https://doi.org/10.1016/S0964-5691\(02\)00083-2](https://doi.org/10.1016/S0964-5691(02)00083-2)
- Ivanov, S., & Webster, C. (2007). Measuring the impact of tourism on economic growth. *Tourism Economics*, 13(3), 379-388. <https://doi.org/10.5367/000000007781497773>
- Jamieson, W., Harold, G., & Christopher, E. (2004). Contribution of tourism to poverty alleviation: Pro-poor tourism and the challenges of measuring impacts. *UN ESCAP*, November.
- Kim, H. J., Chen, M. H., & Soo, C. S. J. (2006). Tourism expansion and economic development: the case of Taiwan. *Tourism Management*, 27(5), 925-933. <https://doi.org/10.1016/j.tourman.2005.05.011>
- Kinyondo, A., & Pelizzo, R. (2015). Tourism, development, and inequality: The case of Tanzania poverty and public policy, *A Global Journal of Social Security, Income, Aid and Welfare*, Wiley Periodicals, USA. <https://doi.org/10.1002/pop4.92>
- Luvanga, N., & Joseph, S. (2003). The role of tourism in poverty alleviation in Tanzania. *Research Report No. 03.4*, Research on Poverty Alleviation (REPOA), Dar es Salaam.
- Mbaiwa, J. E. (2003). The socio-economic and environmental impacts of tourism development on the Okavango Delta, north-western Botswana. *Journal of Arid Environments*, 54, 447-467. <https://doi.org/10.1006/jare.2002.1101>
- Mbaiwa, J. E. (2017). Poverty or riches: who benefits from the booming tourism industry in Botswana? *Journal of Contemporary African Studies*, 35(1). <https://doi.org/10.1080/02589001.2016.1270424>
- Mbaiwa, J. E., & Amanda, L. S. (2010). The effects of tourism development on rural livelihoods in the Okavango Delta, Botswana. *Journal of Sustainable Tourism*, 18(5). <https://doi.org/10.1080/09669581003653500>
- Mkumbo, P. (2010). Tourism distribution channels in the northern tourist circuit of Tanzania. *A Thesis of Master of Tourism Management*. Victoria University of Wellington.
- Ogutu, Z. A. (2002). The impact of ecotourism on livelihood and natural resource management in Eselenkei, Amboseli Ecosystem, Kenya. *Land Degradation and Development*, 13, 251-256. <https://doi.org/10.1002/ldr.502>
- Okello, M., & S. Yerien (2009). Tourist satisfaction in relation to attractions and implications for conservation in the protected areas of the northern circuit, Tanzania. *Journal of Sustainable Tourism*, 17(5), 605-625. <https://doi.org/10.1080/09669580902928450>
- Pleumarom, A. (2007). Does tourism benefit the third world? *Third World Resurgence*. Panang, Malaysia.
- Sanbrook, C. G. (2010). Putting leakage in its place: The significance of retained tourism revenue in the local context in Rural Uganda. *Journal of International Development*, 22, 124-136. <https://doi.org/10.1002/jid.1507>
- Snyman, S. L. (2012). The role of tourism employment in poverty reduction and community perceptions of conservation and tourism in southern Africa. *Journal of Sustainable Tourism*, 20(3), 395-416. <https://doi.org/10.1080/09669582.2012.657202>
- United Republic of Tanzania. (URT, 2002). *Tourism Master Plan: Strategy and Actions, Final Summary Update*, Dar es Salaam, April.
- UNWTO. (2017). *2017 Annual Report*. World Tourism Organization.
- UNWTO. (2019). *World Tourism Barometer and Statistical Annex*. May.
- URT (1999). *National Tourism Policy, September 1999*. Dar es Salaam.
- Walpole, M. J., & H. J. Goodwin (2000). Local economic impacts of dragon tourism in Indonesia. *Annals of Tourism Research*, 27, 559-576. [https://doi.org/10.1016/S0160-7383\(99\)00088-2](https://doi.org/10.1016/S0160-7383(99)00088-2)

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the [Creative Commons Attribution license](https://creativecommons.org/licenses/by/4.0/) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.